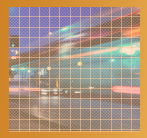
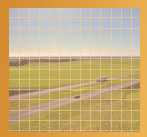
Smart Mobility FRAMEWORK

Smart Mobility 2010: A Call to Action for the New Decade

Presentation to
Joint Project Management Team
Technical Advisory Committee Meeting

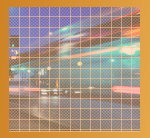
November 19, 2009

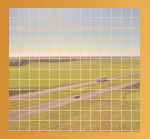




Final Draft

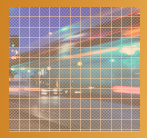
- Complete Handbook Available
- New Emphasis on Action Plan
- Expanded Definition and Principles
- Alignment with New Initiatives including Interregional Blueprint

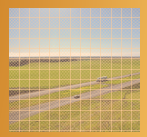




Why Smart Mobility

- Respond to the transportation needs of the state's people and businesses
- Intervene in climate change
- Advance social equity and environmental justice
- Support economic and community development
- Reduce per capita VMT





Smart Mobility: Expanded Definition

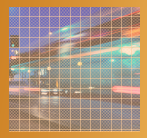
Smart Mobility

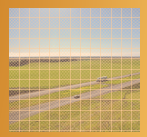
moves

people and freight while enhancing California's economic, environmental and human resources

by emphasizing convenient and safe multi-modal travel, speed suitability, accessibility, management of the circulation network, and efficient use of land.

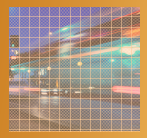
Smart Mobility FRAMEWORK

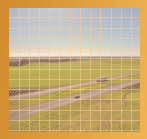




Final Draft

- Key Concepts Unchanged
- Revisions in response to:
  - PMT Comments
  - TAC comments
  - Comments during workshop
  - Feedback after workshop
  - Team synthesis

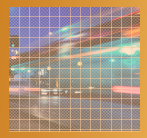


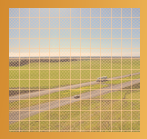


Call to Action

- Executive Summary
- Introduction
- Understanding Smart Mobility
- Smart Mobility Place Types
- Performance Measures
- Putting Smart Mobility to Work
- Resources

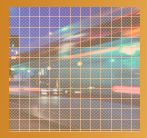
Appendices A, B, C

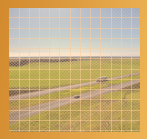




Significant Revisions

- 6 principles (2 added)
- New language re Community Design
- Rankings and Place Type Transitions
- Place Type Guidance Emphasized
- 17 performance measures (change from 8)
- Examples included
- Action Plan Included





Smart Mobility Principles

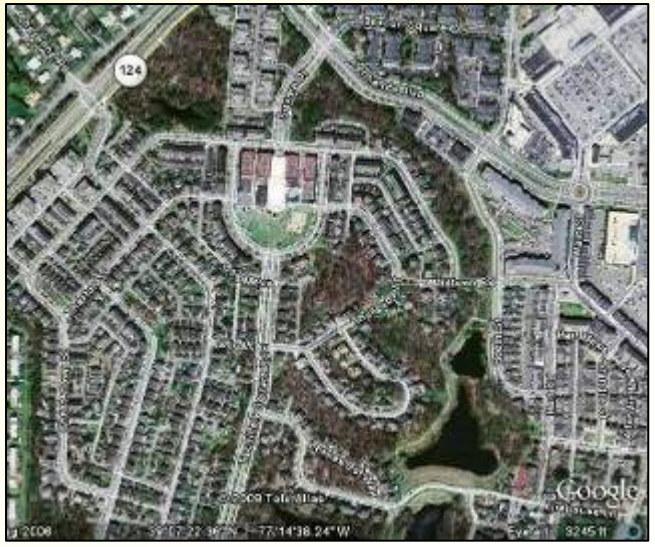
Old

- Location Efficiency
- Reliability
- Health and Safety
- Stewardship

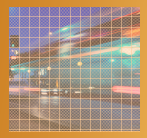
New: Exhibit 3, p. 17

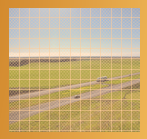
- Location Efficiency
- Reliable Mobility
- Health and Safety
- Environmental Stewardship
- Social Equity
- Robust Economy

Location-Efficient Community Design Factors



Location-Efficient Regional Accessibility Factors

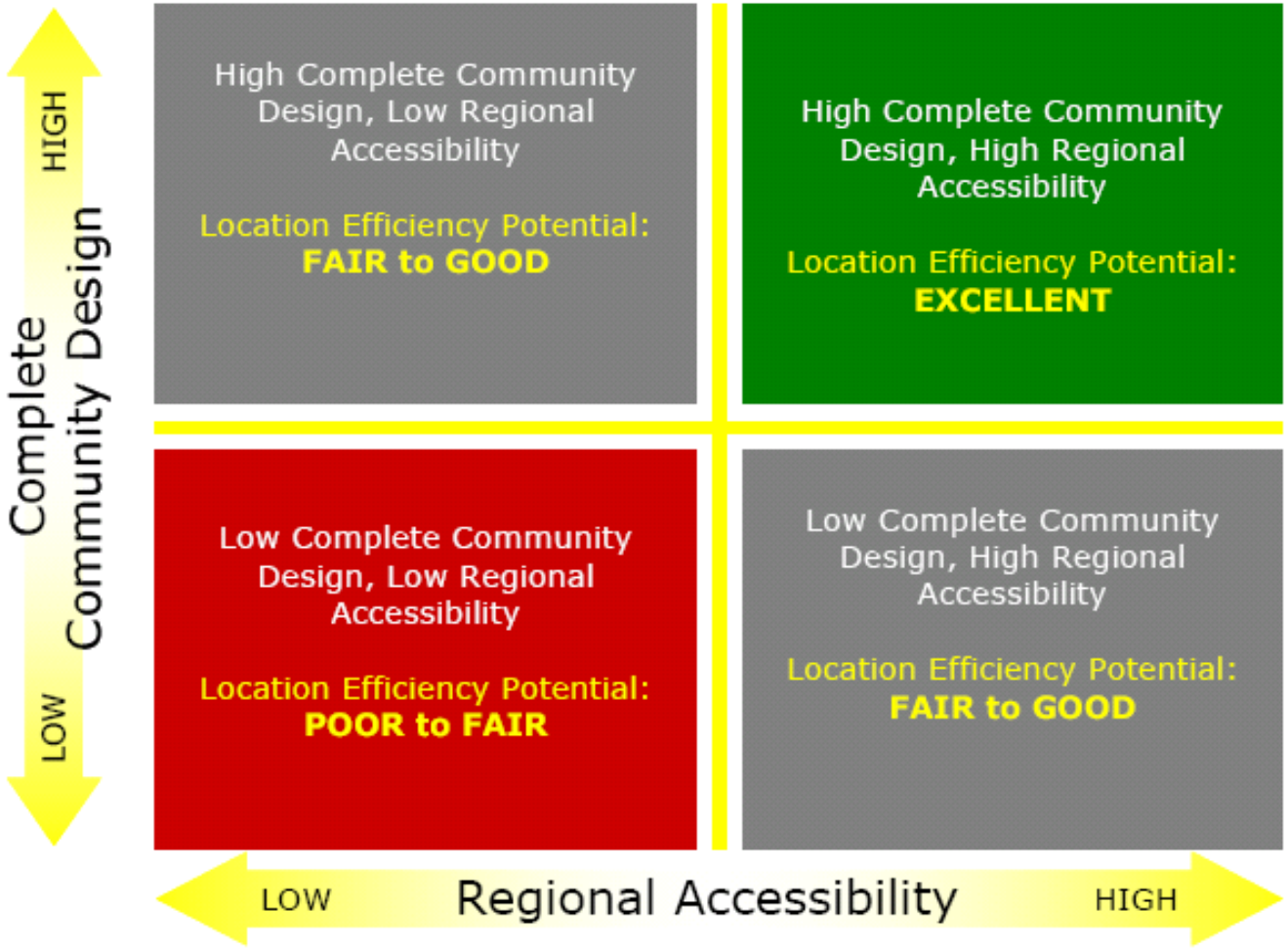




Location Efficiency: new, page 18

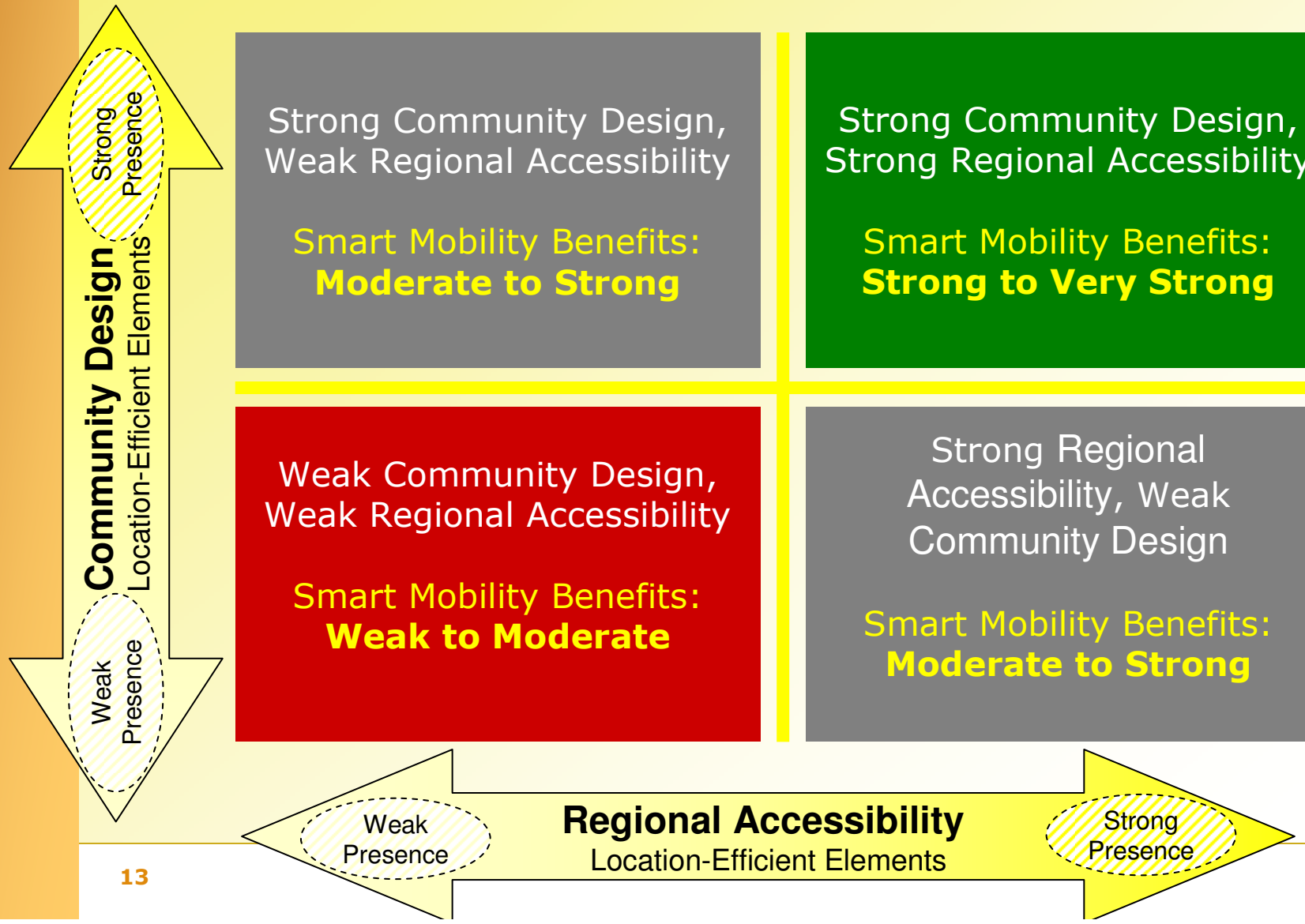
- **Regional Accessibility**: Characteristics of development use, form, and location that combine with the multimodal transportation system to make destinations available through non-SOV travel and efficient vehicle trips at the *regional, interstate, and international scales*, and
- **Community Design**: Characteristics of development use, form, and location that combine with the multimodal transportation system to support convenience, non-motorized travel, and efficient vehicle trips at the *neighborhood and area scale*.

Old Version

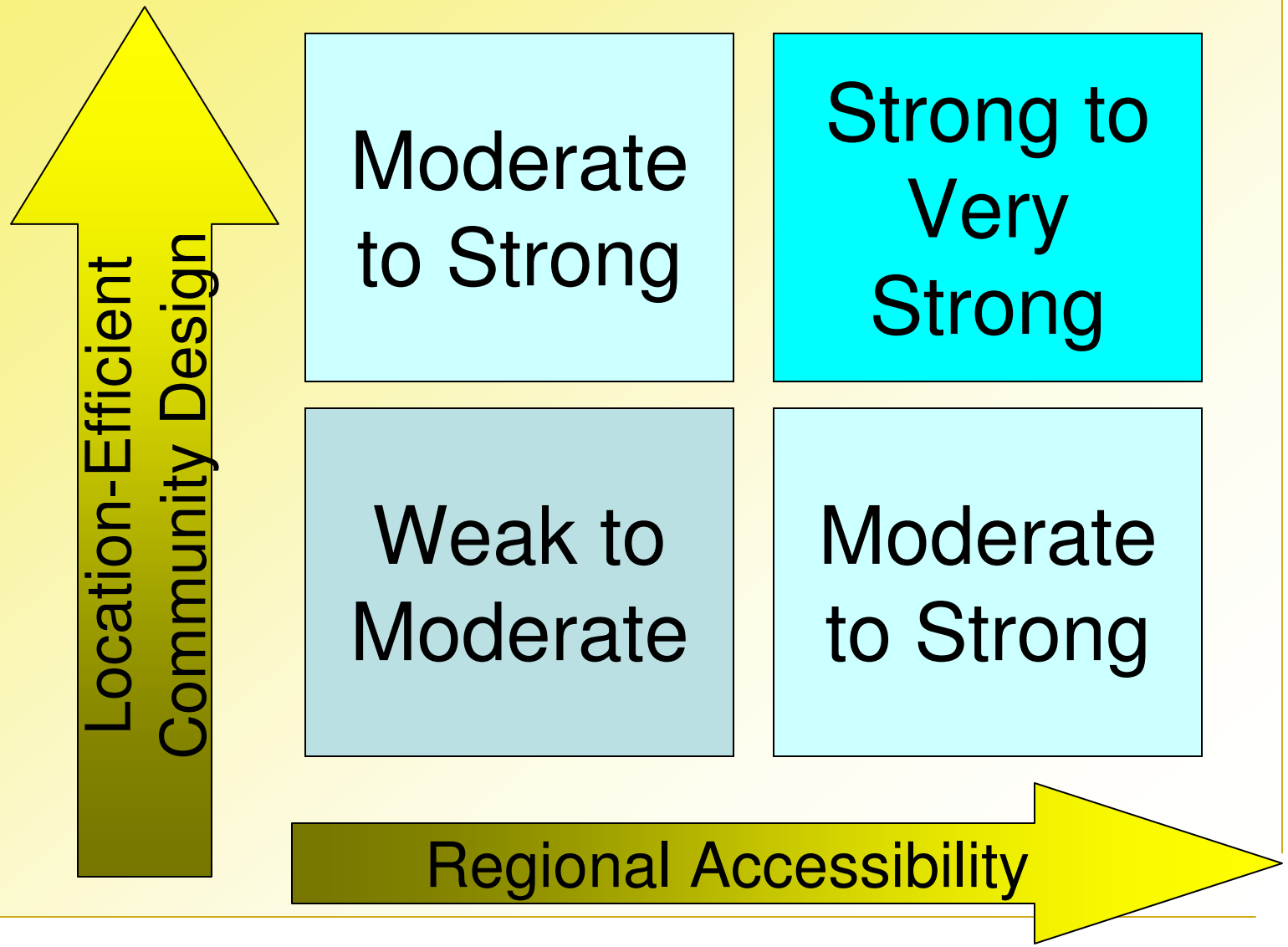


(Page 16, table of elements page 15)

New Version:
Exhibit 6 page 20



Opportunity to Create Location Efficiency (LE) Benefits



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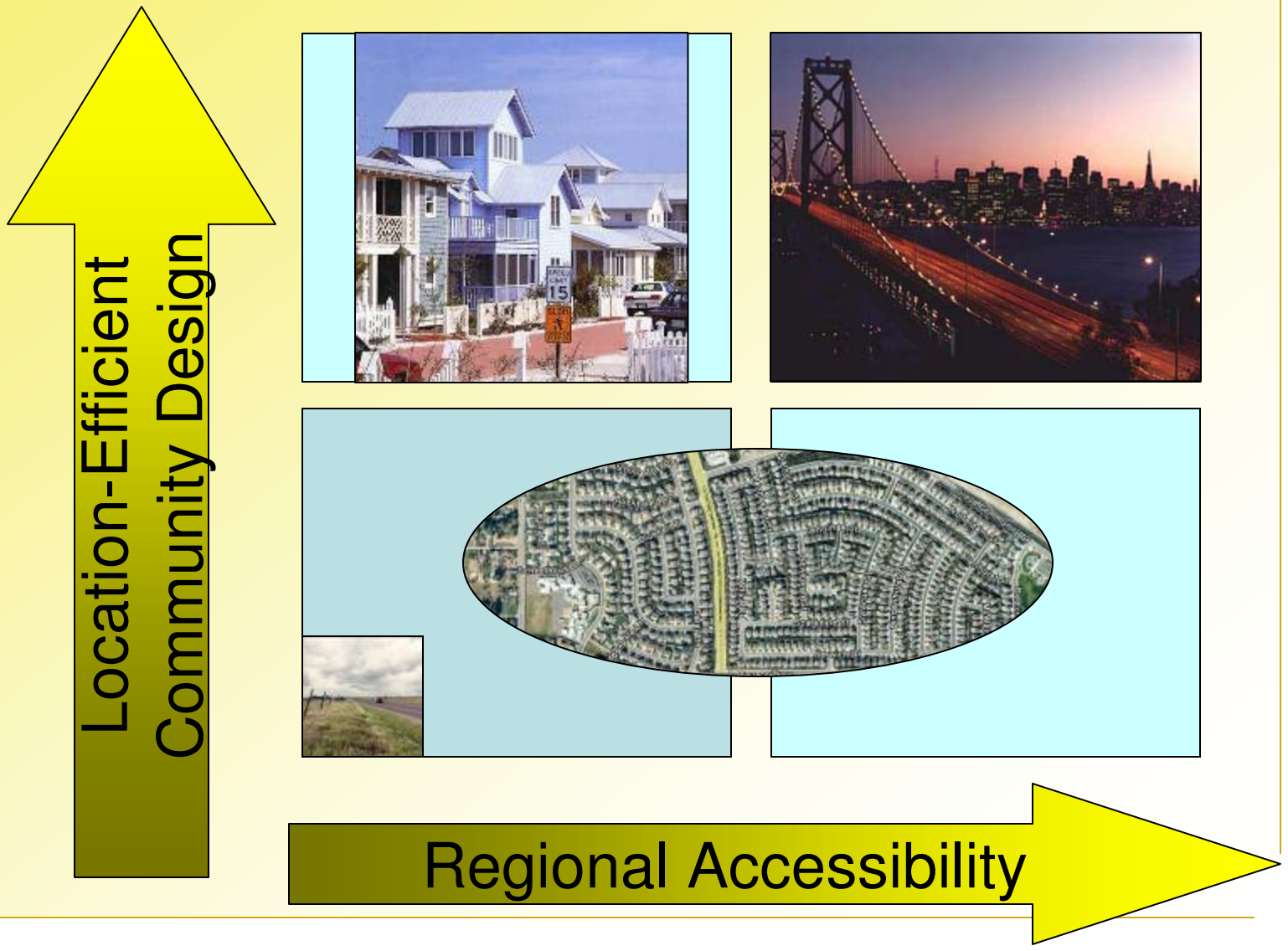


Place Types

There is an appropriate Smart Mobility Framework for all places in the state

Place Type Guidance
New, pages 31-43

Suburban Communities

Smart Mobility Framework

Relative to the principle of location efficiency, suburban communities are characterized by weak presence of community design elements and variable presence of the regional accessibility elements that contribute to location efficiency. Suburban communities will be impacted by these factors for years to come. Achieving Smart Mobility benefits in suburban communities is difficult. These challenges point to the importance of minimizing the creation of new suburban communities, i.e. places ranking poorly relative to both of the Smart Mobility factors. This does not mean that lower-to-moderate density development should be prevented. Rather, all efforts should be made to direct the form of new development so that new compact communities or close-in compact communities are encouraged and incentivized while new suburban community characteristics are discouraged.

New lower-density development should be in the form of urban neighborhoods or compact communities that are characterized by complete community design and whenever possible by high regional accessibility. All levels of government should work together to minimize the creation of new suburban communities because they are characterized by few location efficiency factors, and the absence of these factors will work against efforts to control greenhouse gas emissions and maintain a healthy economy and economy. Instead, new development should be in the form of compact communities, whether close-in or in planned locations remote to urban centers.

The overall Smart Mobility strategy for suburban communities is to transition suburban centers and corridors to close-in compact centers and corridors. Higher density development with location-efficient community design elements would be concentrated in these transition areas. Larger suburban centers may transition to urban centers, which will create regional accessibility benefits for surrounding suburban communities. The implementation possibilities identified below reflect this emphasis on transition away from suburban centers and corridors. Section 3.4 further addresses place type transitions. Stewardship priorities underlie the Smart Mobility Framework for transitioning away from suburban

communities to compact communities and urban centers, with a focus on change in suburban centers and corridors.

In suburban communities, freeway and arterial widening projects, including HOV systems, should be undertaken only when they can be demonstrated to be unlikely to generate increased pressure on outlying lands for suburban expansion. For the same reason, new interchanges on existing freeways should be constructed only where they are tied directly to adopted local and regional plans for new location efficient growth as evidence by Smart Mobility performance measures.

A strong presence of location efficiency factors is difficult to achieve in suburban communities, which is the main reason for the Smart Mobility Framework's emphasis on transformation to other place types. Within suburban communities, activity is relatively concentrated in suburban centers, so suburban opportunities for location efficiency are typically best there.

The principle of Reliability supports an approach to street and intersection operations that focuses on providing predictable travel times through traffic and incident management. Health and Safety principles direct attention in particular to conditions on suburban arterials, many of which lack basic accommodation for bicyclists and pedestrians. Slower speeds and improved facilities will address paramount safety concerns as well as promoting public health outcomes.

Planning

Key Activities:

- Identify centers and corridors that can be transformed into more location-efficient places. Plan for them in terms of land use, urban design character, and transportation services. Given the high level of public investment and the lengthy time horizon required to stimulate these changes, locations should be prioritized to align with market potential and other community objectives.
- Identify near term opportunities to improve health and safety through active travel, safe routes to school programs, and traffic safety initiatives.

Transportation Projects and Programs

Likely priorities in Suburban Communities places:

- Investments that improve the operational efficiency of existing arterial and freeway corridors. (Reliable Mobility, Robust Economy)
- Projects that improve connectivity leading to shorter average trip lengths and increased non-auto mode share. (Location Efficiency, Environmental Stewardship, Health and Safety)
- Investments in "complete streets" and safe routes to school measures that improve conditions for walking and bicycling. (Health and Safety, Social Equity, Location Efficiency)
- Access management and speed management on the arterial system. (Reliable Mobility, Health and Safety)
- Where there are concentrated employment centers, commute transit service and rideshare promotion. (Social Equity, Location Efficiency, Environmental Stewardship)

Development and Conservation Projects and Programs

Likely priorities in Suburban Communities:

- Where high capacity transit stops and stations are located along high capacity transit corridors between cities, transit oriented development with managed parking and car and bike share at stations. (Reliable Mobility, Robust Economy, Environmental Stewardship)
- Strategic redevelopment of commercial corridors and dedicated use areas such as large shopping malls and business parks, in order to incorporate Location Efficiency factors. (Location Efficiency)
- Strong presence of community design factors for all new construction. (Environmental Stewardship, Location Efficiency)

Place Type Guidance
New, pages 31-43

Rural and Agricultural Lands

Smart Mobility Framework

Rural settlements will continue to depend on a high level of automobile use because origins and destinations are dispersed and congestion is a relatively minor concern. A Smart Mobility approach should focus on:

In rural towns:

- Maintaining and creating walkable rural towns with streets that are operated and designed for speeds suitable for their context and safety for all users.
- Centrally locating community-serving uses (public and private) in rural towns
- Using a flexible approach to design and operations of state highways operating as Main Streets, as described in Caltrans' Main Streets: Flexibility in Design and Operations (www.dot.ca.gov/hq/oppd/context/mainstreets2006.pdf)

In agricultural lands:

- Safety for all modes on rural roads.
- Limiting significant SOV capacity expansions (including new freeway interchanges) to avoid inducing unplanned growth.
- Preventing circulation network patterns and/or subdivision patterns that will lead to suburbanization, i.e., not increasing network connectivity in agricultural areas except when required for goods movement.
- Adequate freight capacity for movement of inputs and products.
- In areas with strong tourism components in the local economy, weekend and holiday season visitor-oriented transportation services focused on customer satisfaction and compatibility with area character.

In active farming, vineyard, and grazing areas, the emphasis of Smart Mobility strategies will be on providing access for workers, suppliers, and delivery of products, and on minimizing direct and indirect adverse impacts of transportation facilities on the agricultural economy. These adverse impacts can include fragmentation of agricultural

lands into patches that threaten viable operations, and growth inducing effects that can result in new development in inappropriate locations and forms. Lands in agricultural production are often in a relatively complex pattern with rural settlements.

Agricultural lands and protected lands (discussed below) offer urban form benefits, helping to shape the development footprints of both urban areas and rural towns. In some cases, roads can have a positive function as separators between agricultural and urban properties.

Location efficiency works differently in rural towns than in rural settlements and agricultural lands. In towns, location efficiency derives from a strong presence of Community Design factors. Central location of public facilities such as schools, hospitals, libraries, and post offices in rural towns is an important Regional Accessibility element. In rural settlements, location efficiency is achieved when infrastructure investments are appropriately scaled to the overall modest level of travel demand.

Stewardship has multiple focuses in Rural and Agricultural places. First is the protection of rural character and agricultural resources through concentrating development in towns and compact communities. Stewardship of the rural roads system through asset management is another component. Support for concentrating activities in walkable rural towns and maintaining the rural character of agricultural settlements aims to prevent impacts to natural resources that can be caused by dispersed activities, rural subdivisions, and inappropriate road network connectivity.

Planning

Key activities:

- Map areas that are to retain rural identity for the long term.
- Mapping the boundaries between rural towns, surrounding settlements, and agricultural lands.
- Create cooperative planning processes including local governments, Caltrans, and other stakeholders when rural town main streets are part of the State Highway System.
- Designate lands for long-term agricultural use and distinguish them from rural towns and settled areas with different mobility needs.
- Identify transition areas between urban and suburban places and agricultural/rural ones.
- Identify key routes for goods movement.

Transportation Projects and Programs

Likely priorities in rural and agricultural places:

- Outside of towns, safety improvements to walking and bicycling facilities on rural roads. (Health and Safety)
- Inside towns, walking and bicycling facilities focused on connectivity and comfort. (Location Efficiency, Health and Safety)
- Demand-responsive transit and inter-city transit connecting to major destinations such as hospitals and community colleges. (Social Equity, Reliable Mobility)
- If there are concentrated work destinations within commute distance, park and ride lots associated with freeway interchanges and regional transit services. (Environmental Stewardship)
- High-quality demand-responsive transit and intercity transit services. (Social Equity, Reliable Mobility)
- Network connectivity enhancements within towns. (Health and Safety, Reliable Mobility)
- Visitor-oriented transportation services, particularly in locations with very strong weekend or holiday peak demand. (Robust Economy, Reliable Mobility)
- Network connectivity including required access to inter-regional network needed for movement of agricultural goods and inputs. (Robust Economy)
- Effective speed management at the transition from highway to rural town and on main streets in rural towns accompanied by reduced speeds to maintain and create walkable rural towns in designated locations. (Health and Safety, Location Efficiency, Reliable Mobility)

Development and Conservation Projects and Programs

Likely priorities in rural and agricultural lands:

- Public facilities located in, or, for larger facilities such as schools, immediately adjoining rural towns. (Location Efficiency, Reliable Mobility)
- Full range of needed services and public facilities in rural towns. (Location Efficiency)
- Housing in rural towns meeting the needs of permanent and seasonal rural workers. (Social Equity, Location Efficiency)
- Where it does not presently exist, establishment of regulatory and taxation framework that supports long-term agricultural uses consistent with planning. (Environmental Stewardship)
- Appropriate design character for all development in this place type. (Environmental Stewardship)
- Outside of towns, open space preservation for natural resource value, with connectivity to natural and open space systems. (Environmental Stewardship)

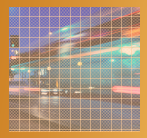
Place Type Transition

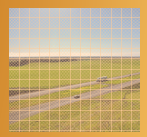
Place Type Transitions
Old

Anchored Places. Places planned to remain as their present type, in which ranking on the smart mobility factors may change somewhat but will not vary significantly over time. In these places, investment decisions will be based on maintaining and enhancing smart mobility factors. Generally, urban centers, compact communities, protected lands, and lands in long term agricultural use are anchored in their present place type. Investment emphasis in Anchored Places is on maintenance and enhancement to maximize smart mobility benefits.

Transitional Places. These places will be targeted for significant change, "evolving" over time to a different place type in order to reach a higher level of smart mobility benefits through location efficiency. In these places, investment emphasis is on supporting evolution to different place types with greater potential for smart mobility benefits.

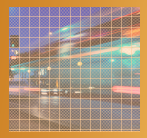
(Page 25, related exhibit p. 26)

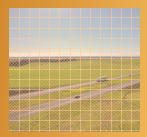




Place Type Transitions: New, page 45

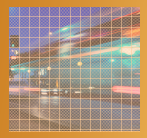
Anchored Places. Places in which the presence of location efficiency factors will increase over time, but where a single Smart Mobility place type framework will consistently apply. In these places, investment decisions would be based on enhancing the presence of location efficiency factors.

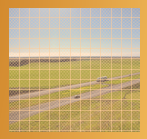




Place Type Transitions: New, pages 44-45

Transitional Places. These places will be targeted for significant change, "evolving" over time to feature a significantly greater presence of location efficiency factors that justifies a change in smart mobility place type framework.





Smart Mobility Principles

1. Location Efficiency
2. Reliable Mobility
3. Health and Safety
4. Environmental Stewardship
5. Social Equity
6. Robust Economy

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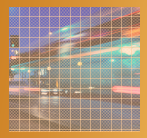
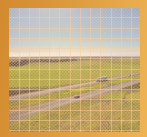
Smart Mobility
FRAMEWORK

Smart Mobility Performance Measures

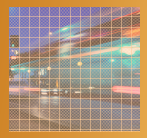
Jerry Walters
Fehr & Peers

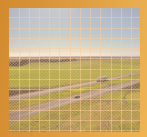




Smart Mobility Principles

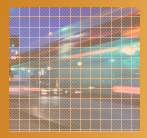
1. Location Efficiency
2. Reliable Mobility
3. Health and Safety
4. Environmental Stewardship
5. Social Equity
6. Robust Economy

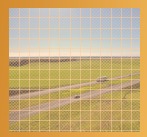




Smart Mobility Performance Measures (Part 1)

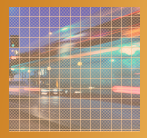
Principle	Performance Measure
Location Efficiency	1. Support for Sustainable Growth
	2. Transit Mode Share
	3. Accessibility and Connectivity
Reliable Mobility	4. Multi-Modal Travel Mobility
	5. Multi-Modal Travel Reliability
	6. Multi-Modal Service Quality
Health and Safety	7. Multi-Modal Safety
	8. Design and Speed Suitability
	9. Pedestrian & Bicycle Mode Share

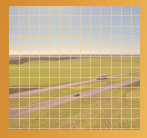




Smart Mobility Performance Measures (Part 2)

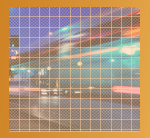
Principle	Performance Measure
Environmental Stewardship	10. Climate and Energy Conservation
	11. Emissions Reduction
Social Equity	12. Equitable Distribution of Impacts
	13. Equitable Distribution of Benefits
Robust Economy	14. Congestion effects on Productivity
	15. Efficient Use of System Resources
	16. Network Performance
	17. Return on Investment

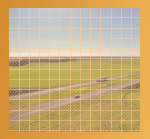




Smart Mobility Concepts

1. Multi-Modal Focus
2. Speed Suitability
3. Activity Connectedness
4. Network Management





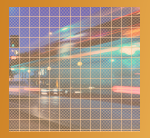
Smart Mobility Concepts 1-2

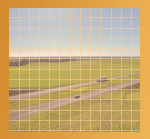
1. Multi-Modal Focus

- all transportation system users
- replace auto-oriented measures
- e.g.: safety, travel time, reliability, LOS

2. Speed Suitability

- context-sensitive target speed, instead of "design speed" based only on facility type
- enforce through physical design features and speed management techniques

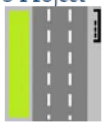
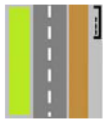
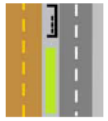




1. Multi-Modal LOS in 2010 HCM

- **Auto**: stops/ mile, % speed limit, median, turn lanes
- **Transit**: wait time, ride time, loading, ped LOS
- **Pedestrians**: ped density, sidewalks, buffers, street width, traffic level
- **Cyclists**: lane width, traffic and truck count and speed, parking, pavement and stops

Multi-Modal LOS Example

Alternative	Person Delay (sec per person at avg intersection)	BRT Rider Delay (sec per person at avg intersection)	Vehicle Delay (sec per vehicle at avg intersection)
1, No Project 	20.8	20.9	19.3
2, Curb BRT Lanes 	19.1	10.6	19.3
3, Center-Side w/ two medians 	19.7	10.2	20.9

Alt. 2 reduces total traveler delay by 8% with no increase in vehicle delay.

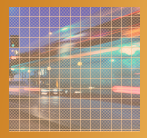
Alt. 3 increases vehicle delay by 8% but reduces delay for all travelers 5%.

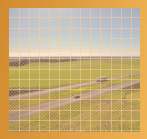
Arup, Van Ness Ave BRT Alternatives Analysis, 2008

2. Speed Suitability Improves Safety for all Users

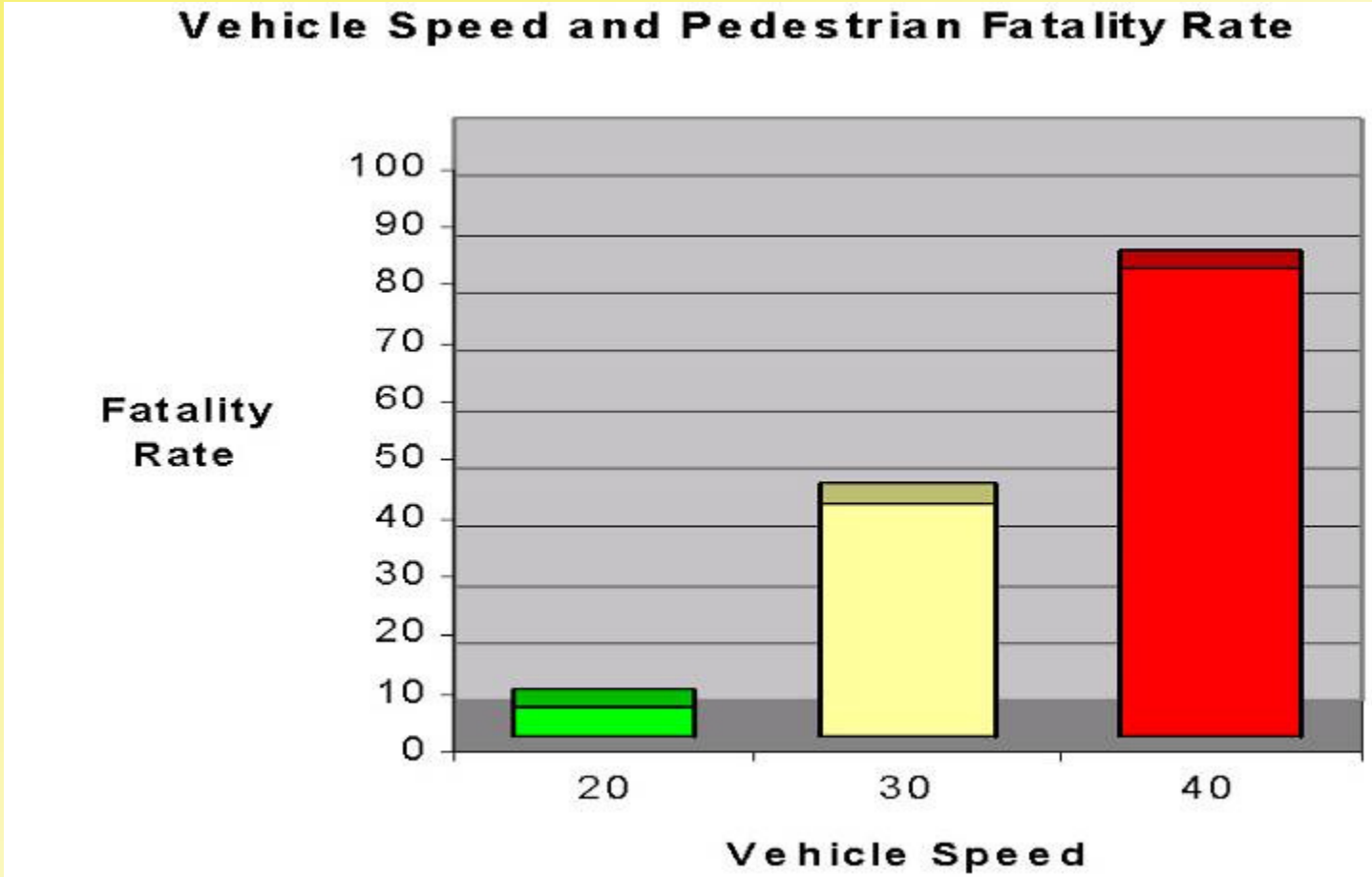
At 40 mph the driver's focus is on the roadway in the distance.

At 30 mph the driver begins to see things at the road edges in the background.

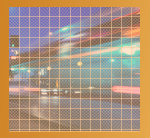


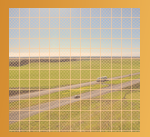


Speed Suitability Improves Safety for all Users

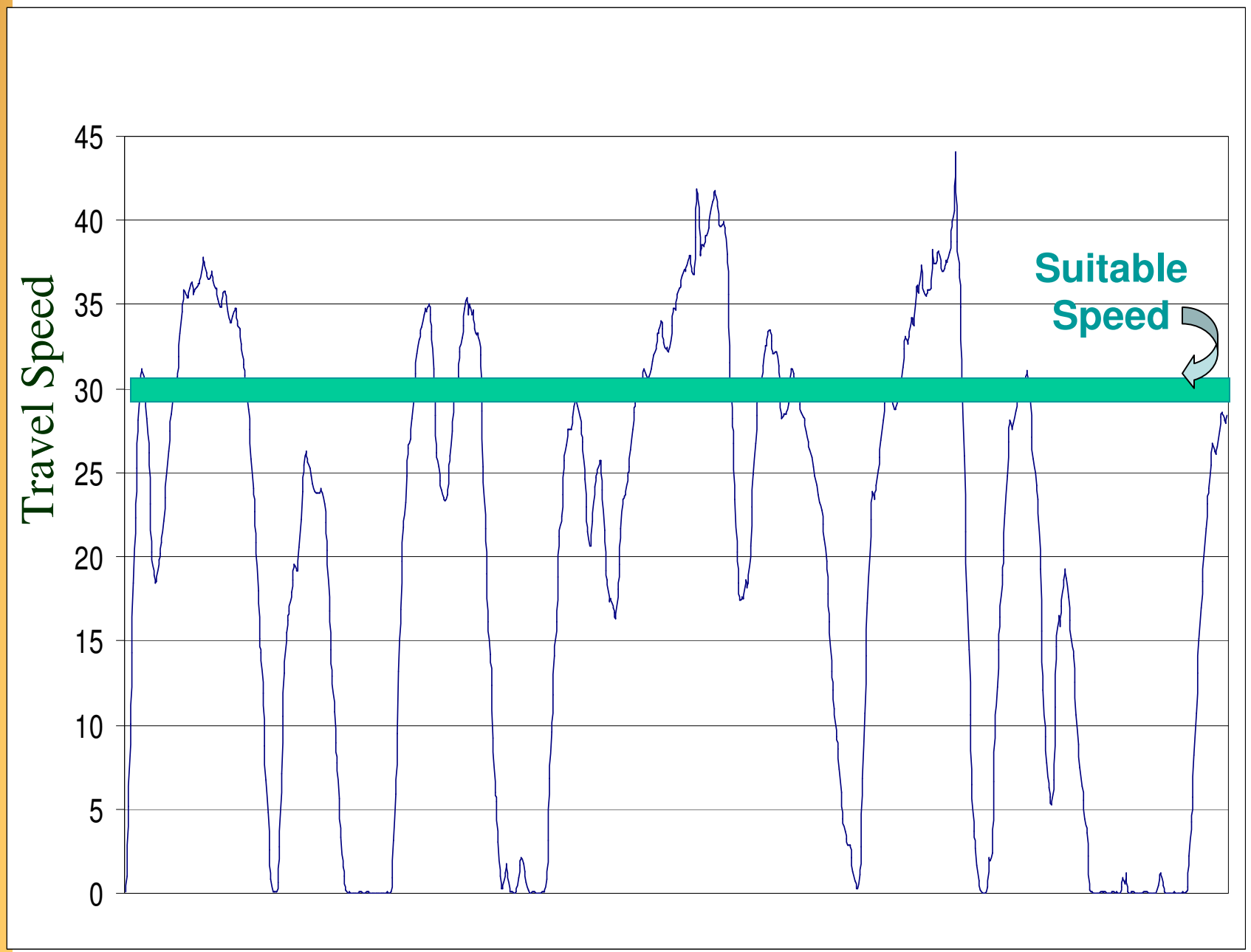


Smart Mobility FRAMEWORK

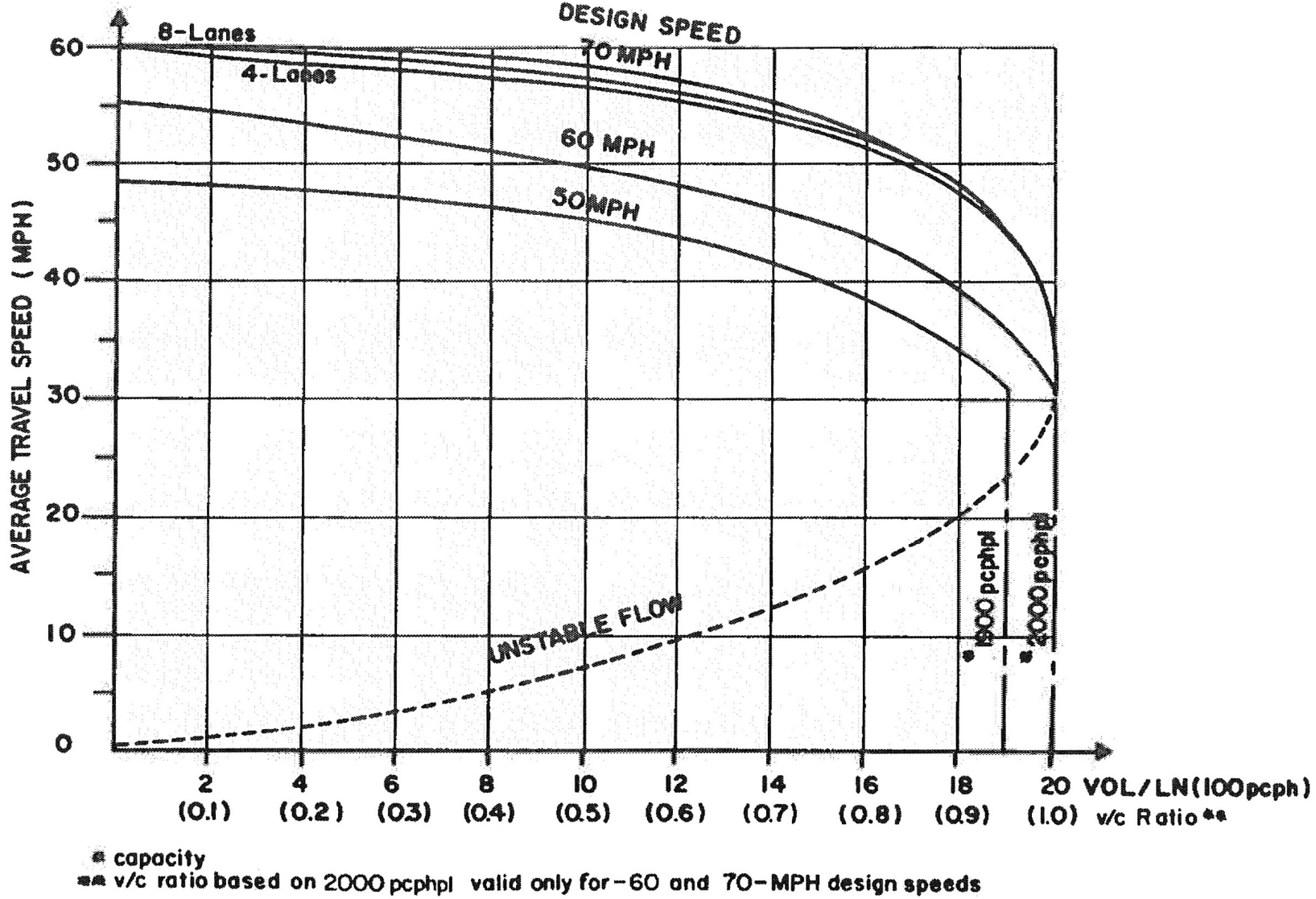




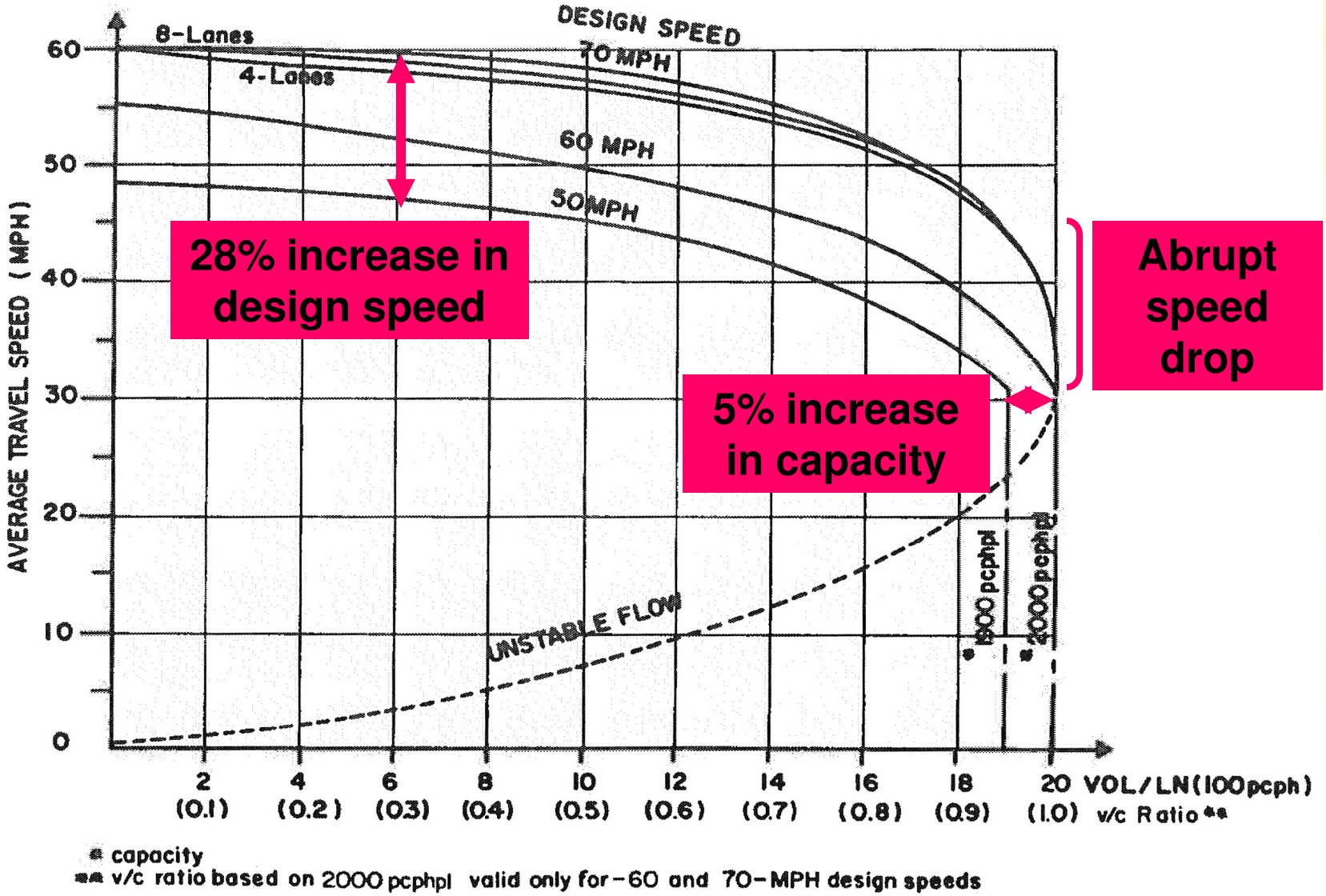
Objective-Based Speed Management

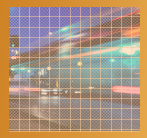


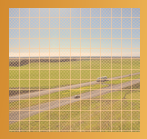
Speed Management and Carrying Capacity



Speed Management and Carrying Capacity







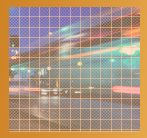
Smart Mobility Concepts 3-4

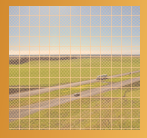
3. Activity Connectedness

- travel distances and modal connections among activities
- minimize induced development and induced travel.
- minimize the total travel miles

4. Network Management

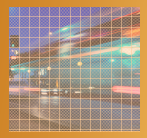
- accommodate greatest number of travelers with minimal instability.
- emphasize network connectivity
- emphasize efficiency, ITS

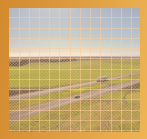




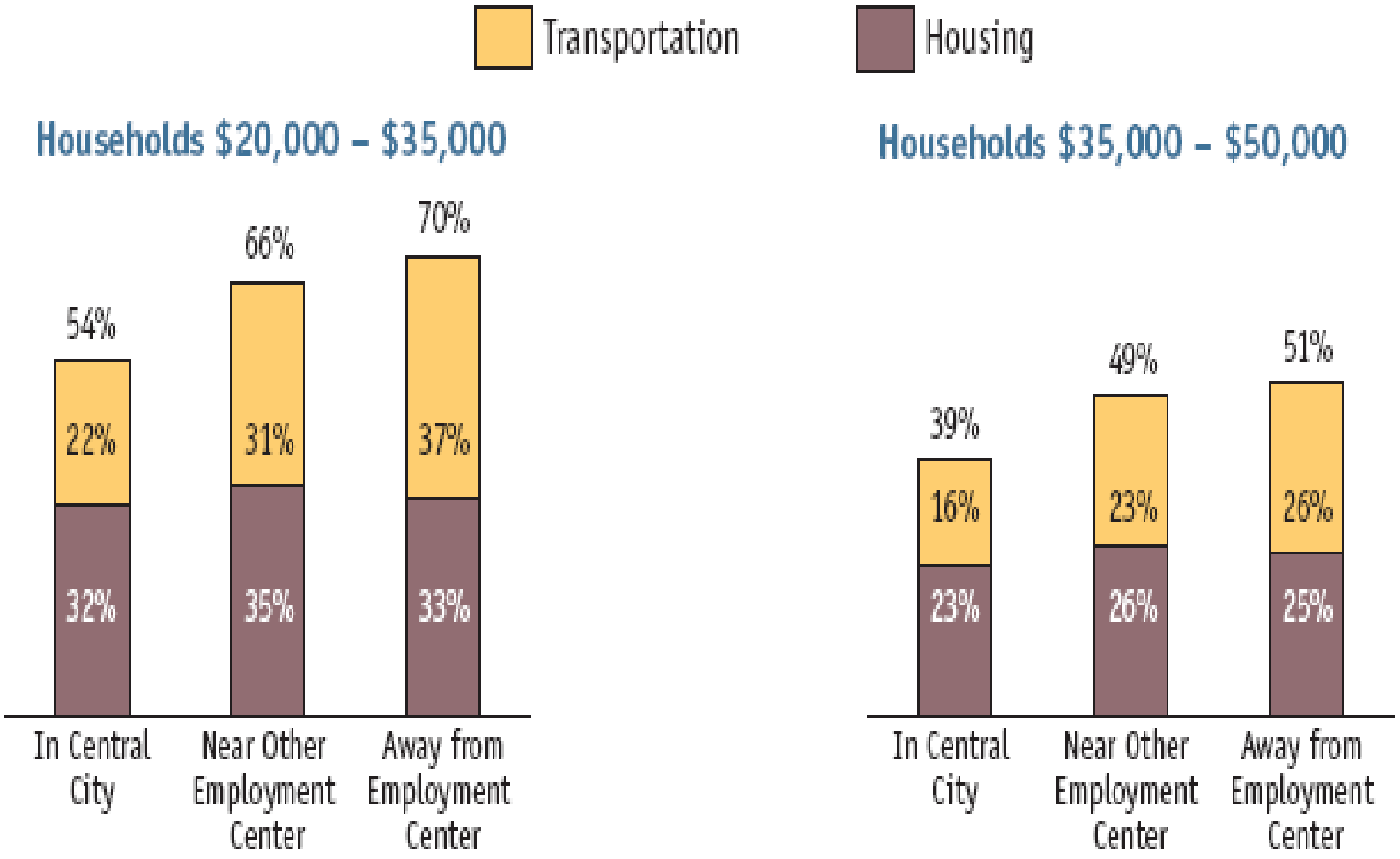
3. Activity Connectedness

- Location efficiency and stewardship
- Limit induced development and induced travel
- Reduce separations between:
  - workers and jobs
  - shoppers and shopping
  - families and schools
  - residents and social, rec.



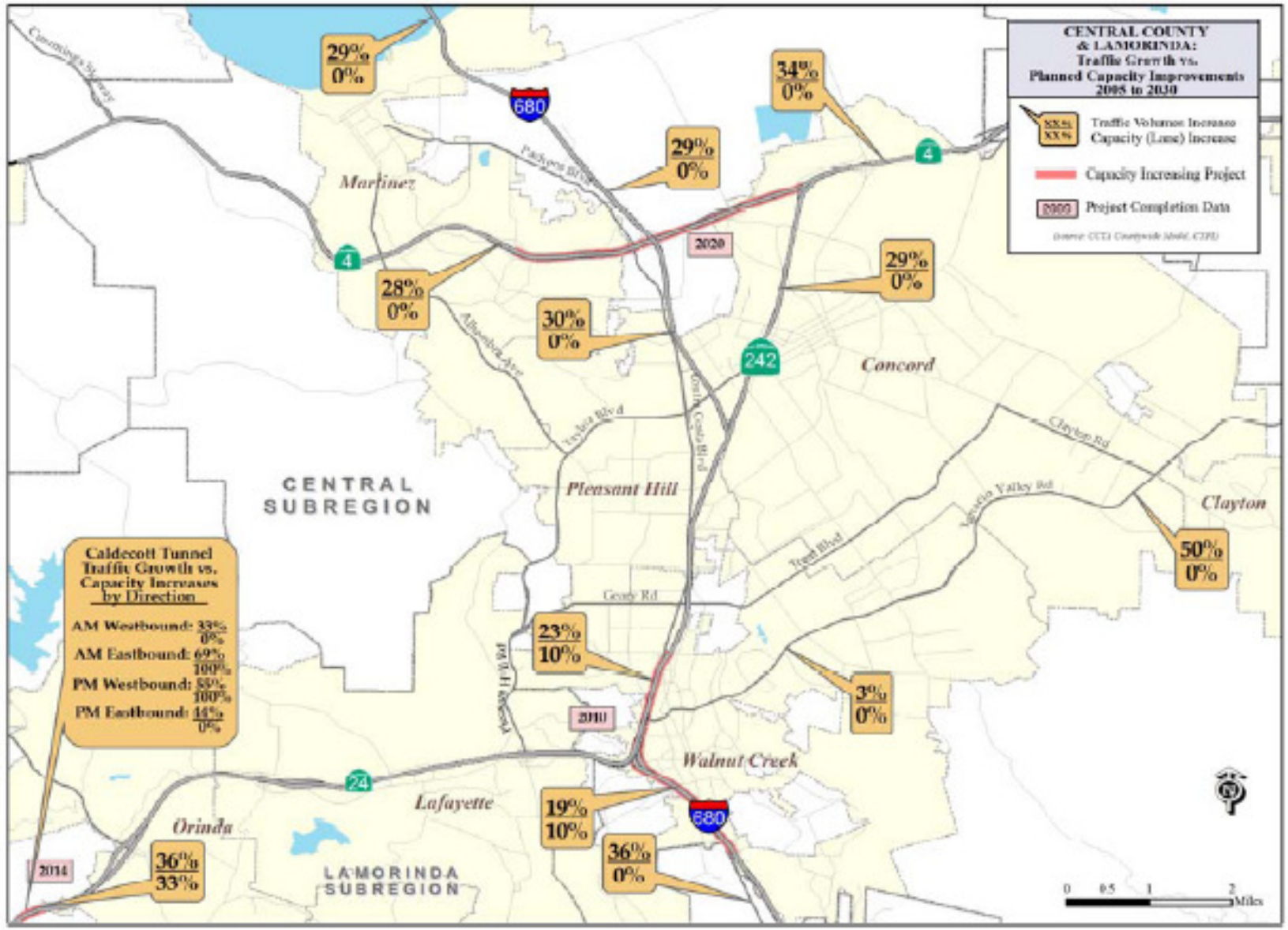


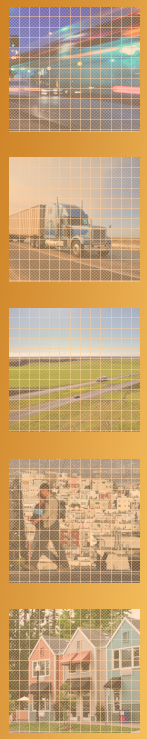
Share of Income Spent on Housing and Transportation



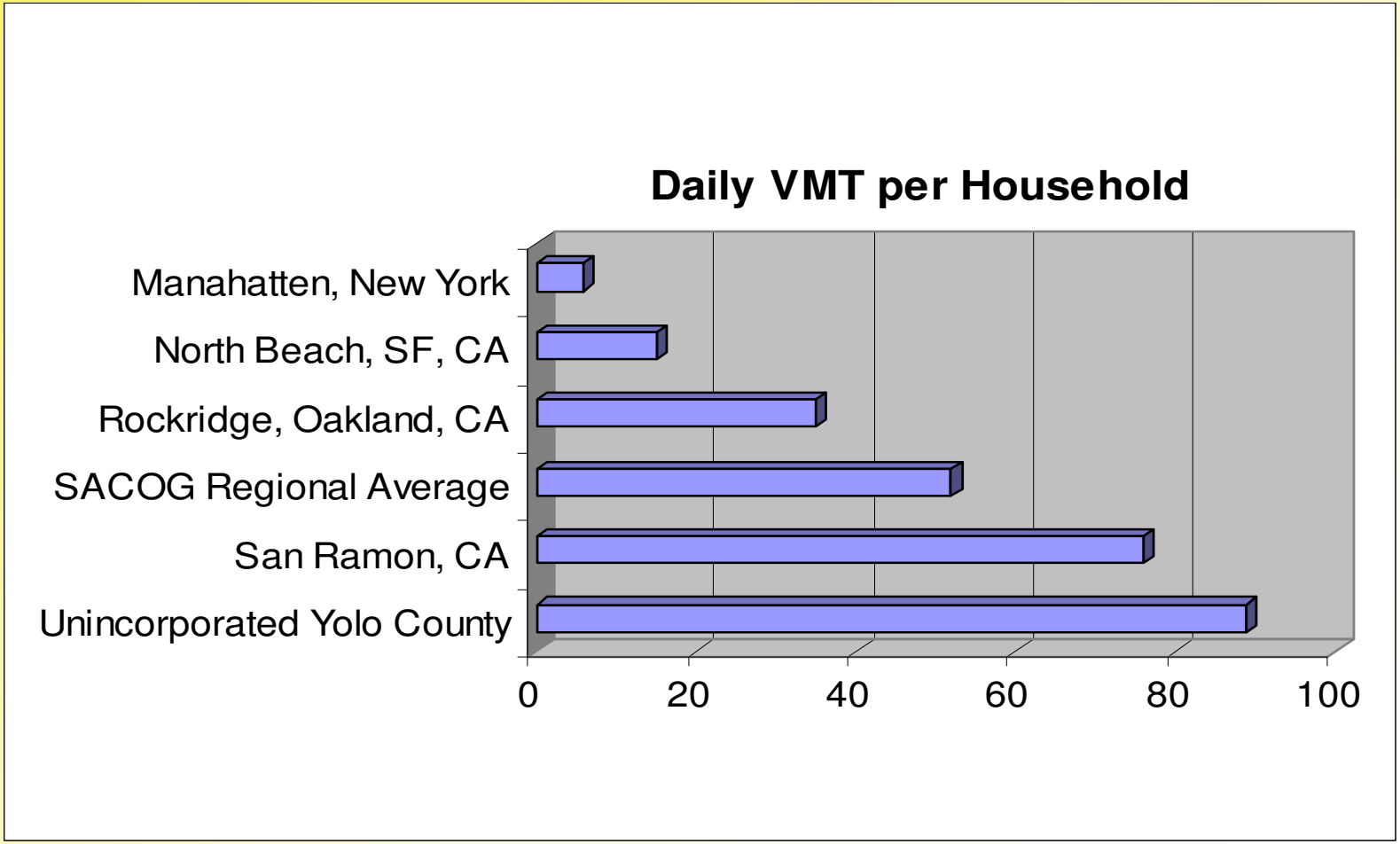
Source: Center for Neighborhood Technology, 2006

Transportation Growth Constraint: 30% traffic growth/ 10% cap. growth

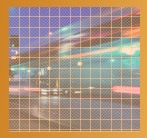


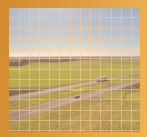


Daily VMT per Household



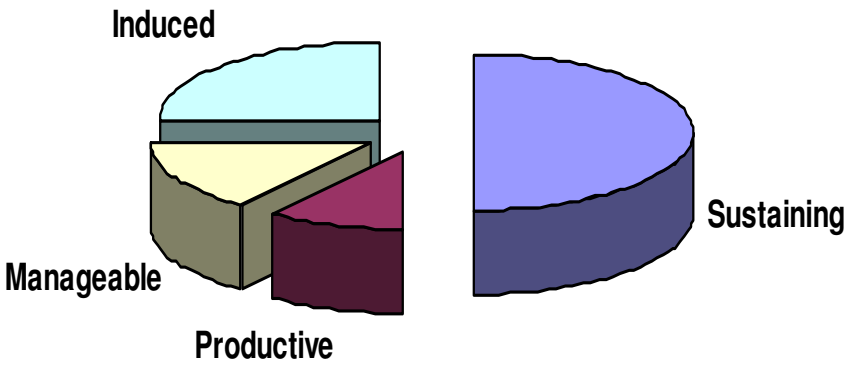
Smart Mobility FRAMEWORK

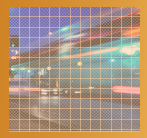


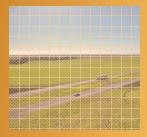


4. Network Management vs System Expansion

- Address in Blueprints and RTP SCS
  - Transportation improvements support SCS
  - Address interregional travel
  - Limit induced travel
- Types of per capita VMT
  - Sustaining
  - Manageable
  - Productive
  - Induced







Network Management Strategies

Congestion Mitigation

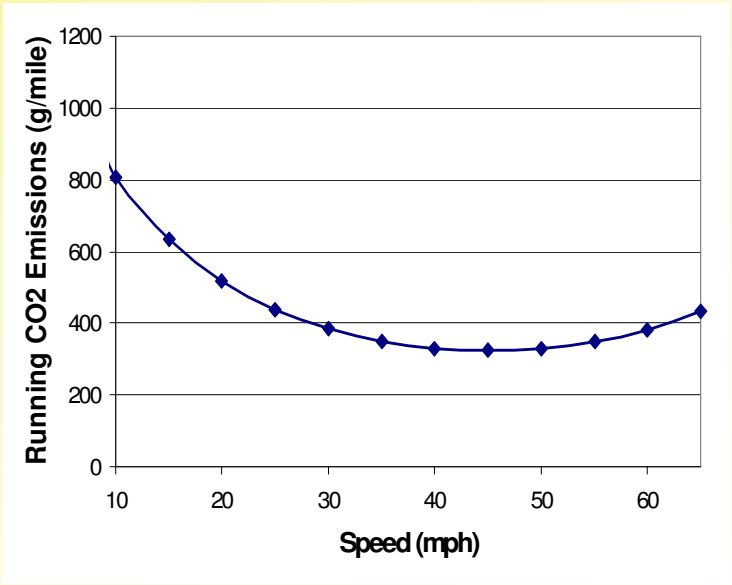
- Signal coordination
- Ramp metering
- Incident management

Flow Smoothing

- Variable speed limit
- Intelligent speed adapt.

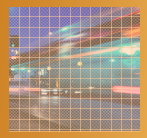
Speed Management

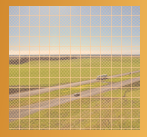
- Improved enforcement
- Speed limiters
- Active accelerator pedal



Barth, Matthew; *ITS and the Environment,* UCR, 2008

Smart Mobility FRAMEWORK



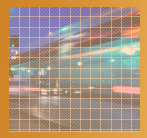


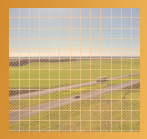
Reduced Footprint and Costs for Construction and Maintenance

- narrower total roadway width
- tighter curvature*
- narrower clear zones
- lower super-elevation
- smaller intersections/ interchanges

*Tighter Curvature	50 mph	70 mph
Horizontal Curvature	1000 feet	2500 feet
Vertical Curvature	1000 feet	3000 feet

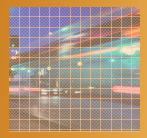
*

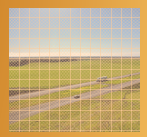




Location Efficiency Metrics

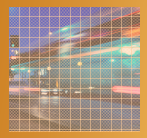
Performance Measure	Recommended Metrics
1. Support for Sustainable Growth	Consistency with regional Sustainable Communities Strategy. Comparison of alternatives based on acres of land consumed, and relative reductions in induced VMT through: compact 4D land use strategies (density, diversity, design, destination accessibility), demand management, and network management.
2. Transit Mode Share	Percentage of trips within a corridor or region occurring by bus, rail or by other form of high-occupancy-vehicle.
3. Accessibility and Connectivity	Number of households within 30 minute transit ride of major employment center, within 20 minute auto ride of employment, within walking distance of schools. Weighted regional travel time and cost among trip producers and trip attractors.

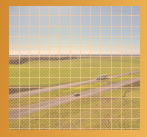




Reliable Mobility Metrics

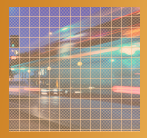
Performance Measure	Recommended Metrics
4. Multi-Modal Travel Mobility	Travel times and costs by mode between representative origins and destinations, aggregated over corridor or region.
5. Multi-Modal Travel Reliability	Day-to-day variability of travel times between representative origins and destinations by mode, aggregated over corridor or region.
6. Multi-Modal Service Quality (Level of Service: LOS)	Mode-specific and blended LOS measures of pedestrian and bicycle accommodation and comfort, transit availability and reliability, and auto travel efficiency.(1)

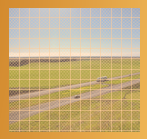




Health and Safety Metrics

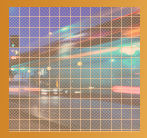
Performance Measure	Recommended Metrics
7. Multi-Modal Safety	Collision rate and severity by travel mode and facility, compared to statewide averages for each user group and facility type.
8. Design and Speed Suitability	Conformance with guidance identifying suitable design elements and traffic speed with respect to mix of modes and adjoining land uses and area character. (2)
9. Pedestrian & Bicycle Mode Share	Percentage of trips within a corridor or region occurring by walking or cycling.

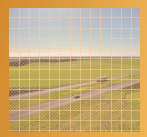




Environmental Quality, Social Equity Metrics

10. Climate and Energy Conservation	VMT per capita by speed range relative to State and regional targets. (3)
11. Emissions Reduction	Quantities of criteria pollutants and greenhouse gases
12. Equitable Distribution of Impacts	Impact of investments on low-income, minority, disabled, youth and elderly populations relative to impacts on population as a whole.
13. Equitable Distribution of Access and Mobility	Comparative travel times and costs by income groups and by minority and non-minority groups for work/school and other trips.





Robust Economy Metrics

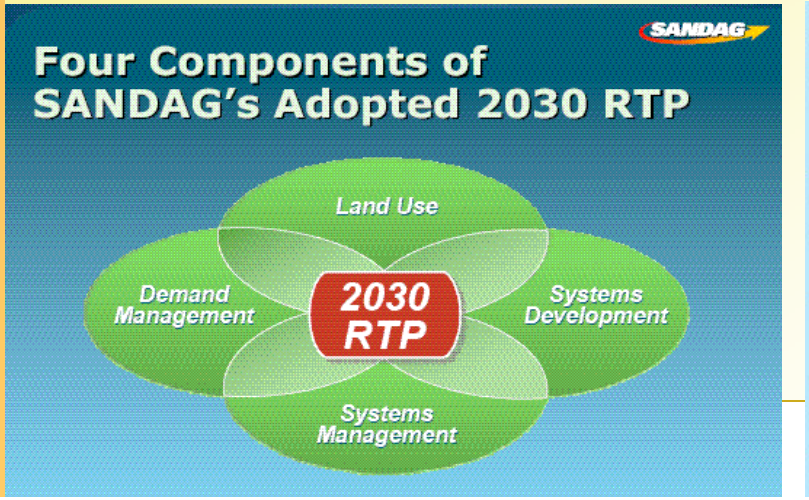
14. Congestion effects on Productivity	Time lost to congestion by trips that are economically productive and/or sustaining of essential mobility, measured as vehicle hours of delay (VHD).
15. Efficient Use of System Resources	Additional vehicle miles of travel (VMT) that are associated with economic productivity and/or sustaining of essential mobility compared with system expansion cost and impact.
16. Network Performance Optimization	VHD per capita, per lane mile, per private vehicle mile, per freight vehicle mile, per transit revenue mile, and in total.
17. Return on Investment	Person miles and revenue per lane mile of road, per transit revenue mile and per dollar invested (from all public and private funding sources). Comparison of alternatives based on benefits per dollar invested relative to: a) system user benefits (time and expense), and b) other Smart Mobility Performance Measures.

Smart Mobility
FRAMEWORK

Smart Mobility Performance Measures

Case #1: RTP + SCS

- Coordinate transportation (RTP) and land use planning (SCS) to achieve:
  - acceptable levels of travel accessibility
  - regional economic vitality
  - cost-effective infrastructure investments
  - minimal environmental impacts, induced travel
  - Conformity with AB32 and SB375

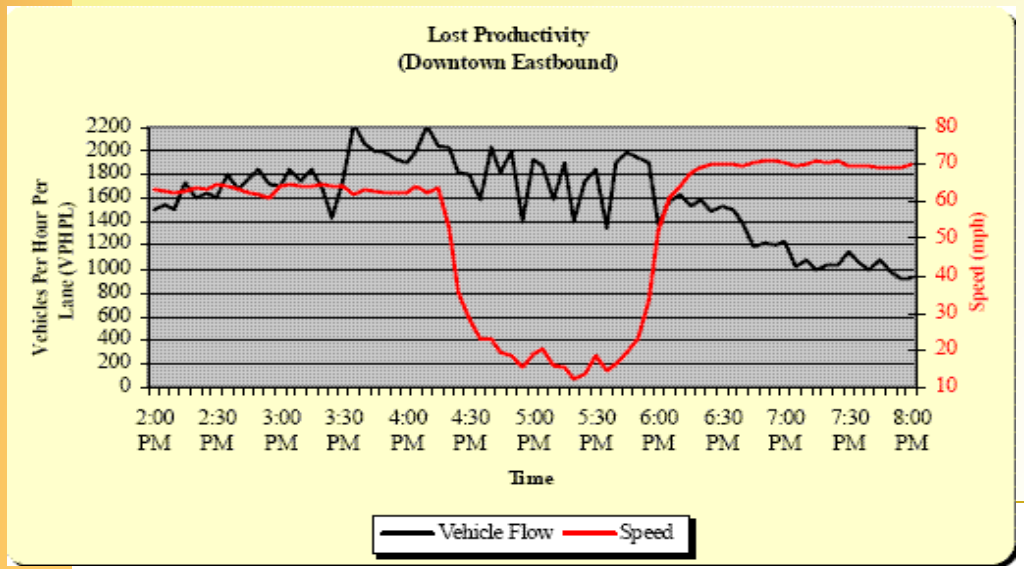


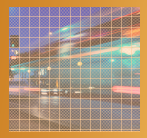
Case #2: Context Sensitive Design

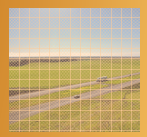
- Arterial creates barrier and economic disincentive through established community
- Goal to improve safety and convenience for travelers and affected community and sustain community value

Case #3:
Management of Freeway Corridor

- 50-mile transportation corridor exhibits:
  - traffic congestion
  - lack of parallel roadway capacity
  - transit facilities approaching ridership capacity
  - incomplete HOV network
  - gaps and barriers within the bicycle network

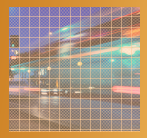


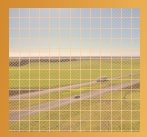




Equity

- Plan-level and project-Level
- Evaluate costs, benefits and impacts differentially by
  - economic and ethnic group
  - geographic area



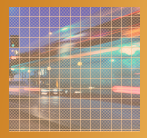


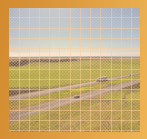
Performance Measures with Equity Dimensions

- Accident rates
- Speed suitability
- Modal mobility, consistency
- Activity connectedness
- Universal Accessibility (ADA)
- Emissions and noise impacts
- Land use efficiency
- LOS

Smart Mobility FRAMEWORK

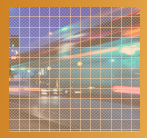
Implementation Actions: Draft Checklist

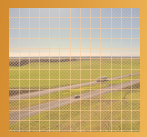




Implementation Actions: 10 Themes

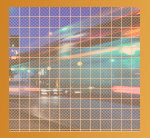
1. SMF Impact
2. Interregional Blueprint
3. Caltrans Policy & Practice
4. Other Departments' Activities
5. Data & Tools
6. Planning & Programming
7. Design Standards & Procedures
8. Major Cross-Functional Initiatives
9. Local Government Planning
10. Local Government Implementation

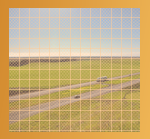




Implementation Actions: 10 Themes

- Activities
- Recognition as State, Regional or Local Responsibilities
- Participating agencies
- Initiation Time Frame
- Handbook References
- Relevant Activities and Resources





Implementation Actions: Highlights

- Support for Ongoing Activities
  - Regional Blueprint Planning
  - Complete Streets Implementation
  - HDM revisions
- Call for New Initiatives
  - Interregional Blueprint
  - Speed Suitability Initiative
  - Location-efficiency Initiative
- Integration with Related Activities
  - Sustainable Communities Planning and Alternative Planning Strategies
  - Federal Sustainable Communities Partnership